

Issued April 8, 1915.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE,
W. A. GRAHAM, COMMISSIONER; B. W. KILGORE, STATE CHEMIST
AND DIRECTOR OF TEST FARMS.

SOIL SURVEY OF RANDOLPH COUNTY,
NORTH CAROLINA.

BY

R. B. HARDISON, OF THE U. S. DEPARTMENT OF AGRICULTURE,
AND S. O. PERKINS, OF THE NORTH CAROLINA
DEPARTMENT OF AGRICULTURE.

HUGH H. BENNETT AND W. EDWARD HEARN, INSPECTORS,
SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1913.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., September 14, 1914.

SIR: During the field season of 1913 a soil survey was made of Randolph County, N. C. This work was done in cooperation with the North Carolina Department of Agriculture, and the selection of this area was made after conference with State officials.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1913, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture,

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MAP.

Soil map, Randolph County sheet, North Carolina.

SOIL SURVEY OF RANDOLPH COUNTY, NORTH CAROLINA.

By R. B. HARDISON, of the U. S. Department of Agriculture, and S. O. PERKINS, of the North Carolina Department of Agriculture.

DESCRIPTION OF THE AREA.

Randolph County is situated approximately in the center of North Carolina. It is bounded on the east by Alamance and Chatham Counties, on the south by Moore and Montgomery Counties, on the west by Davidson County, and on the north by Guilford County. The county comprises an area of 749 square miles, or 479,360 acres.

The topography of Randolph County is gently rolling to hilly and semi-mountainous. Extending from Spero in a westerly direction to the Hoover Hill mine and thence in a course parallel with the Uharie River into Montgomery County, is a chain of high hills locally called "mountains." The largest of these are Caraway, Sheppard, Back Creek, Cedar Rock, Black, and Long Mountains. Numerous other hills similar to these occur throughout the southwestern two-thirds of the county. The interstream country is characterized by a gently rolling to rolling surface, becoming broken and hilly as the streams are approached. Narrow strips along the streams comprise the only gently sloping areas in the county.

The Uharie and Deep Rivers and their tributaries form two drainage systems, the former carrying off the water from the western part of the county and the latter from the eastern part. Little River, which rises near Ashboro, forms the headwaters of a third drainage basin. The drainage divide separating the main basins follows closely the course of the Southern Railway from the point

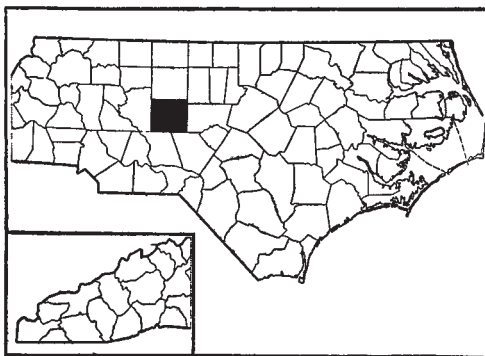


FIG. 1.—Sketch map showing location of the Randolph County area, N. C.

at which it crosses the Randolph-Guilford County line to Ashboro, continuing along the Norfolk & Southern Railroad to Seagrove. From this point it follows the plank road into Moore County. A secondary drainage divide enters the county near Staley and follows the county highway through Liberty, Liberty Grove Church, and Liberty School to Julian.

The territory now included in Randolph County was settled early in the eighteenth century. The settlers were mainly from Pennsylvania. The county was established in 1779. In 1790, the year of the first Federal Census, a population of 7,276 is reported. In 1850, or 60 years later, the population was 15,832, and according to the Thirteenth Census, 29,491. Ashboro, the county seat, situated nearly in the center of the county, has a population of 1,685. It is the site of furniture, flour, and lumber manufacturing plants. Randleman, an important cotton manufacturing town, with a population of 1,950, is situated on the Deep River 9 miles north of Ashboro. Ramseur, with a population of 1,022, is an important cotton, furniture, and broom manufacturing town. Numerous other small villages and towns are distributed throughout the county.

Randolph is among the foremost flour manufacturing counties of the State. In addition to the mills in the towns and villages, roller mills are in operation along the important streams of the county. Cotton manufacturing is also an important industry. It is reported that there are in operation in the county a total of 57,456 spindles, 1,988 looms, and 539 cards. These are operated by water and steam power. Preparations are being made to operate the Deep River mill at Randleman partly by electricity.

Transportation facilities are furnished mainly by branch lines of the Southern and Norfolk & Southern Railways. The High Point & Ashboro branch of the Southern enters the northwestern corner of the county and extends to Ashboro. From this point the Raleigh, Charlotte & Southern, a branch of the Norfolk & Southern, extends south across the center of the county. The Greensboro, Climax & Ramseur branch of the Southern Railway crosses the Randolph-Guilford County line near the center and continues southerly to Ramseur. At Climax, in Guilford County, this branch connects with the Greensboro & Sanford branch of the Southern, which crosses the northeastern corner of the county. The main line of the Southern Railway from Charlotte to Greensboro and the Carolina & Yadkin River Railroad cross the extreme northwestern corner of the county.

Prior to 1913 the county roads were in rather poor condition. Until this time the only graded and surfaced road in the county extended from Ashboro through the center of the county to the

southern boundary, a distance of about 15 miles. At present good roads branch out from Ashboro in every direction.

High Point and Greensboro, in Guilford County, and Pinehurst, in Moore County, are the principal markets outside the county.

CLIMATE.

The climate of Randolph County is typical of the warm Temperate Zone. Owing to the relatively high elevation and rolling topography of the county, the climate is notably healthful. The winters are short and comparatively mild, and the summers, although long, are usually not excessively hot. Snows are of frequent occurrence during midwinter months, but the fall is usually light and remains on the ground for only a few days.

According to the records of the Weather Bureau station at Ramseur, the county has an average annual temperature of about 57° F. The lowest temperature recorded is —16° F., and the highest 101° F. The annual precipitation averages about 50 inches. The rainfall is ample for the crops commonly grown and is well distributed, being heaviest during the growing season and lightest during the fall months or time of harvest.

The earliest date of killing frost reported in the fall is October 1, and the latest in spring May 6. The average date of the first killing frost in fall is October 17, and of the last in spring April 16. This gives a normal growing season of somewhat over 180 days.

The data in the table below, giving the normal monthly, seasonal, and annual temperature and precipitation, were compiled from the records of the Weather Bureau station at Ramseur:

Normal monthly, seasonal, and annual temperature and precipitation at Ramseur.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	40.0	75	— 5	3.78	3.22	2.30
January.....	37.6	71	— 9	3.55	3.90	9.62
February.....	38.7	75	—16	4.58	4.01	5.80
Winter.....	38.8			11.91	11.13	17.72
March.....	48.9	86	6	4.23	1.76	10.50
April.....	56.4	95	22	3.53	1.53	2.70
May.....	66.4	98	31	4.03	2.56	7.50
Spring.....	57.2			11.79	5.85	20.70

Normal monthly, seasonal, and annual temperature and precipitation, etc.—Con.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
June.....	73.5	100	35	4.31	1.71	3.25
July.....	76.8	100	49	5.61	4.91	8.00
August.....	74.9	101	43	5.55	2.59	6.88
Summer.....	75.1			15.47	9.21	18.13
September.....	69.1	100	32	4.07	5.09	2.00
October.....	56.8	89	22	3.21	7.36	.50
November.....	46.9	85	12	3.02	2.18	3.50
Fall.....	57.6			10.30	14.63	6.00
Year.....	57.2	101	—16	49.47	40.82	62.55

AGRICULTURE.

The lowlands along the streams were the first to attract the settlers of the territory now included in Randolph County. The principal crop was corn. Wheat was not extensively grown by the first settlers, but as early as 1775 it had become the crop of second importance.

Live stock was brought into the region by the settlers, though a large part of the meat supply consisted of game and fish. At a later period and until the time of the Civil War hogs were driven into the county from other States. Sheep were raised both for mutton and for wool.

Flax was grown to a small extent, and later some cotton was produced. The flax and cotton were used mainly for clothing. Considerable tobacco was grown for home use and just prior to the Civil War a little was grown near Ramseur for market.

By 1785 Fayetteville had become an important trading center, and from this time until about 1860 this was the principal market for Randolph County. Flour, bacon, lard, and distilled liquors were exchanged for salt, coffee, sugar, and spices, and for iron for making agricultural implements. About 1840 a number of tanneries and one or two pottery plants were in operation in the county, and considerable leather and pottery were taken to Fayetteville.

By 1840 agriculture had attained a comparatively stable basis, and it continued without many material changes until about 1880. From

the first corn and wheat were the crops of first and second importance, and they still hold these respective positions. From the time wheat was first grown to about 1860 the yields were somewhat larger than for a period of 40 years following the Civil War. This was due to the fact that the lands were fresher, and to the use of greater quantities of barnyard manure. Better agricultural implements were gradually introduced, but no decided changes along this line took place prior to 1880.

The development of the present system of agriculture began with the introduction of improved farm machinery. The first big plows were used about 1888, and with their introduction deep land breaking and more thorough preparation of the seed bed began. The two-horse and three-horse steel beam plows were first used about 20 years ago and were soon followed by disk and cutaway harrows. Riding plows have become popular within the last few years. Grain drills and binders have been used in the county for about 35 years. The first corn drills were used about 1893, and a few years later corn harvesters were introduced. Mowing machines have been in use for about 30 years.

Since the introduction of improved farm machinery agricultural methods have rapidly changed in Randolph County. Thirty-five years ago wheat was sown on the surface of unbroken ground and turned under with a "dixie" plow or simply scratched in with a bull tongue; usually a brush was run over the surface. Commercial fertilizers were almost unknown. At present the best farmers break wheat land in June, July, or August with a plow drawn by two, three, or four horses and turning the soil to a depth of 6 to 12 inches. The land is then harrowed, and in September or October it is again plowed and fined with a disk or cutaway harrow and a mellow seed bed formed. Stable manure is applied just before the last breaking or sometimes just before the last harrowings. The wheat is drilled in usually between October 10 and November 15. The fertilizer is distributed with the drill at the time the wheat is seeded. The quantity and composition of the fertilizer used vary, but most of the farmers use about 200 pounds per acre of a 10-4¹ mixture. In a few instances 400 to 600 pounds per acre are used profitably. Some farmers prefer an 8-2-2 mixture. If wheat follows corn the land is not broken earlier than September 1, and usually is plowed only once. The yields resulting from these methods range from 8 to 45 bushels per acre, the latter, however, being rare. By the old method a yield of 10 bushels per acre was the maximum. The changes that are taking place in the production of corn and other crops are equally as marked as in the case of wheat.

¹ 10 per cent phosphoric acid, 4 per cent potash.

According to the census of 1910, 41,467 acres were planted to corn in 1909, with a total yield of 621,804 bushels, or an average of about 15 bushels per acre.

The total area seeded to wheat is reported as 29,662 acres, giving a yield of 255,533 bushels, or an average of about 8½ bushels per acre.

Cotton is probably the crop of third importance, though it is grown only in a few localities. The census of 1910 reports 1,792 acres in cotton, with a production of 758 bales.

Oats are grown to a considerable extent, and are mainly fed in the straw. A yield of 93,777 bushels from 6,854 acres is reported in the 1910 census.

Within recent years clover has become an important crop. It is used both for feed and as a soil improver. Rye is sown in some sections of the county for the grain, and patches for grazing are found on nearly every farm. In 1909 the rye harvested from 539 acres yielded 3,909 bushels. A considerable quantity of hay is obtained from wild grasses and these afford excellent grazing. In 1909 a total of 2,342 acres was mowed and yielded 2,790 tons of hay. In addition, a total of 3,178 acres is reported in tame or cultivated grasses, with a production of 3,107 tons of hay.

Tobacco is grown only in the northwestern corner of the county and near Levelcross. The 1910 census reports 74 acres in this crop in 1909, with an aggregate yield of 42,157 pounds.

Irish potatoes and sweet potatoes are grown for home use and the local markets. All varieties of garden vegetables common to this section of North Carolina are also grown for home use. Sorghum is grown in small patches near the houses and made into sirup for home consumption. Small fruits do well in all sections of the county, but the fruit produced is not sufficient to meet local needs.

Dairying is not practiced in the county. One or two milch cows, which furnish milk and butter for home use, are kept on each farm. Each farmer raises hogs to supply pork and lard for home use, and some pork is sold at local markets. However, large quantities of pork and lard are shipped into the county for use in the towns. Poultry raising is of considerable importance and this industry is growing.

Throughout Randolph County the farmers generally recognize that the different soils are adapted to different classes of crops. The Georgeville silty clay loam and the smoother phases of the Georgeville silt loam, found in the southern part of the county and in places as far north as the Guilford County line, are well suited to wheat, and it is on these types that the greater part of the wheat is grown. The Cecil clay loam and clay are also well adapted to wheat, but the

aggregate acreage of these types is relatively small. Wheat is grown to some extent on all of the soils of the county, except on the stony types, though it is grown on the sandy soils and the Congaree silt loam mainly as one step in the needed crop rotation. It is claimed that wheat frequently fails on the sandy soils. This is doubtless due to the low water-holding capacity of these types.

The Congaree silt loam is the best soil of the county for corn, and for this crop it is held in high esteem. However, the better phases of most of the upland soils give good yields of corn, especially where proper care is taken in the preparation of the seed bed and in the subsequent cultivation. Some corn is grown on the Cecil and Durham soils.

The Durham coarse sandy loam, sandy loam, and fine sandy loam, found only in the northern part of the county, are especially well suited to bright-yellow tobacco. The farmers seem to recognize this, but only a small acreage is devoted to this crop. That tobacco is not more extensively grown is probably due to the absence of near-by markets. Cotton is grown mainly on the Durham and Cecil soils, though to some extent on all the soils except the Congaree silt loam and Georgeville stony loam.

Red clover does best on the heavy soils, and as a rule it is not grown on the sandy loams. The crimson and white German clovers do well on all the soils of the county.

Crop rotation is practiced to some extent in Randolph County, but it is by no means general or systematic. The most common rotation consists of seeding wheat after corn, with wheat again the third year. In some instances clover is put in the drill with the wheat or is planted with a clover seeder just behind the wheat drill. Still another practice is to sow the clover on the wheat in the spring and drag a brush harrow over it. One cutting of clover hay is taken the first year and another in June of the second year, the clover being turned under in July and the land seeded to wheat in the fall.

According to the 1910 census, 433,040 acres are in farms in Randolph County, 144,912 acres being improved. The farms vary in size from 25 to 350 acres. Many holdings comprise a thousand or more acres, but such lands are generally unimproved. About three-fourths of the farms are operated by the owners. Where rented on shares, under the most common practice the landowner furnishes the land and one-third of the fertilizer, receiving one-third of all the grain. Under this plan the tenant furnishes labor, tools, and stock, and two-thirds of the fertilizer used, receiving two thirds of the grain and all roughage. In some cases the landlord furnishes the land, stock, tools, and one-half of the fertilizer and receives as his share one-half of all the crops produced.

Farm labor is generally scarce. Both white and colored laborers are employed. When hired by the month they are paid \$15 to \$20 and board. For hoeing cotton and other special work men are paid 75 cents to \$1 a day, and women about 50 cents a day.

The value of farm land varies widely in different sections of the county. Near Ashboro and the larger towns the best land is valued at \$50 to \$60 an acre. The more rolling and stony lands are valued at \$10 to \$40 an acre. In the southwestern corner of the county uncleared land with no merchantable timber sells for \$4.50 to \$5 an acre. The best upland soils around Farmer are held at \$50 to \$75 an acre. In places the Congaree silt loam—the bottom-land soil—is valued at \$75 to \$100 an acre.

Although the agriculture of Randolph County has shown remarkable progress during recent years, there is still room for improvement in the methods generally practiced. In the preparation of the land for wheat repeated deep breakings followed by a series of harrowings have become the general rule rather than the exception, owing to the better results obtained. Land intended for other crops is also broken deeply in late summer or early fall and allowed to absorb the winter rains. Best results with crop rotations are had where the rotations are so arranged that clover or cowpeas can be turned under at the time of breaking the land and where a liberal application of lime is made either immediately before or immediately after breaking.

Since the soils of the greater part of Randolph County are well suited to the production of corn, clovers, and small grains, the stock-raising industry offers excellent opportunities. With the addition of the barnyard manure obtained through stock raising, the soils are made capable of producing better clover and grain crops each succeeding year.

SOILS.

Randolph County lies wholly in the Piedmont Plateau, and all of the upland soils are derived through processes of weathering from local rock formations.

Practically three-fourths of the county is occupied by a rock formation which apparently is closely associated with the Carolina Slate Belt, or Carolina Metamorphic Slate and Volcanic Belt. The slate rocks include laminated slates and some dense, massive rocks without slaty structure. The laminated slates vary in color from light gray to dark bluish gray or greenish gray, and in texture from very fine-grained material to material of medium coarseness.

The more massive slates have in some instances nearly the same color as the true slates, but more often they are slightly darker and fresh fractures frequently show reddish spots, due probably to the

oxidation of iron compounds. These more massive slates are exceedingly hard and brittle and are very resistant to the agencies of weathering.

From these slate rocks two distinct soil series are derived, the Georgeville series and the Alamance series. The Iredell loam and stony loam are also derived in part from the slates. The one characteristic common to all the types owing their origin to the rocks of the slate belt is their uniformly very fine or silty texture.

The Georgeville series is represented in Randolph County by three types—the stony loam, the silt loam, and the silty clay loam. The Alamance series is represented by only one type, the silt loam.

With the exception of a narrow strip through the center, the northern part of the county and the greater part of the eastern section as far south as Moffitt are underlain by formations consisting mainly of granites and intrusive rocks, such as diorite and diabase. The granites give rise to two distinct series of soils, the Cecil and the Durham.

Owing to differences in the texture of the granites and in the extent of weathering, the soils differ in texture. For example, on many knolls, ridges, and areas occupying stream slopes a sandy mantle which was formerly present has been removed by erosion, giving rise to areas of clay or clay loam. However, many areas of the clay and clay loam soils evidently have never had a sandy surface covering, but owe their origin to deep and thorough weathering of the finer textured granites. On the other hand, many areas of the sandy loam types probably represent former heavier soils from which the silt and clay have been washed out, leaving the sandy material, while the coarse sandy loam soils are formed either from granites carrying coarse, resistant quartz particles or from materials in which incomplete weathering has left fragments of the parent rock. In many instances these unweathered rock fragments have been left on the surface in such quantities and of such size as to give rise to stony soil types. The outcrop of quartz veins also has given rise to stony spots.

The Cecil series in Randolph County includes four types, the coarse sandy loam, the fine sandy loam, the clay loam, and the clay. The Durham series includes the coarse sandy loam, sandy loam, and fine sandy loam types.

The Iredell soils are derived mainly from the intrusive diorite and diabase. The stony loam, sandy loam, and loam are the only types occurring in areas of sufficient size to be shown on the soil map.

The only alluvial soil of the county is the Congaree silt loam. This type owes its origin to materials brought down by water coming from the uplands.

The following table gives the names and the actual and relative extent of the several soils mapped in Randolph County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Georgeville silt loam.....	172,900	36.0	Durham sandy loam.....	12,352	2.6
Alamance silt loam.....	65,728	13.7	Iredell sandy loam.....	9,600	2.0
Georgeville silty clay loam....	65,408	13.6	Durham coarse sandy loam...	8,640	1.8
Iredell loam.....	37,504	7.8	Cecil coarse sandy loam.....	1,856	.4
Congaree silt loam.....	26,496	5.5	Iredell stony loam.....	1,792	.4
Cecil fine sandy loam.....	24,960	5.2	Cecil clay.....	512	.1
Cecil clay loam.....	18,432	3.9			
Georgeville stony loam.....	17,152	3.6	Total.....	479,360
Durham fine sandy loam.....	16,128	3.4			

CECIL SERIES.

The Cecil series includes the most important and widely distributed soils of the Piedmont Plateau. The heavier members are known as the "red-clay lands." These soils are characterized by their red-clay subsoils and gray to red soils, the lighter color prevailing in the sandy members. A characteristic of the subsoil is the content of sharp quartz sand and the frequent occurrence of veins of quartz. Mica flakes are also usually present in the subsoil. The soils are of residual origin and derived principally from granite and gneiss, weathered to great depths, so that rock outcrops are rare. Fragments and boulders of the parent rock are, however, found in places on the surface. The topography is rolling to hilly, with level to undulating areas in situations where stream erosion has not been active.

CECIL COARSE SANDY LOAM.

The surface soil of the Cecil coarse sandy loam consists of a brownish-gray to reddish-brown coarse sandy loam, with a depth of 5 to 10 inches. The subsoil is a red, stiff clay, carrying an appreciable quantity of coarse sand, which gives it a slightly more friable structure than the typical subsoil of the Cecil types. A part of the area mapped has a surface material consisting of a fine sandy loam carrying coarse sand and fine gravel. On some of the slopes in local areas where erosion is active the sandy mantle has been removed, leaving the red clay exposed.

The Cecil coarse sandy loam is not extensively developed in Randolph County. The largest area occurs about 2 miles south of Julian along Sandy Creek. Other areas of the type occur at Redcross, 2½ miles southeast of Redcross, and 3 miles southwest of that

point. A number of small areas are found about 2 miles south of Cedar Square Church. The dominant areas of this type occupy the gently rolling to rolling ridges and knolls and the slopes bordering the stream courses. In a few localities where it occurs over the steeper slopes the type is badly eroded, but the topography of the type as a whole is favorable to farming. The open structure of the surface soil, together with the rolling topography, insures excellent natural drainage.

The native vegetation on the Cecil coarse sandy loam consisted largely of hardwoods, but practically all of this timber has been removed and nearly all of the type is under cultivation.

This soil is well suited to corn, cotton, sweet potatoes, and vegetables, while apples and peaches are grown for home use. Corn produces 15 to 35 bushels per acre, averaging about 20 bushels. Cotton yields range from one-third to 1 bale per acre. The yields of wheat, oats, and clover are low. The turning under of such crops as clover, cowpeas, and rye, and the addition of barnyard manure, are decidedly beneficial.

The value of the Cecil coarse sandy loam ranges from \$30 to \$50 an acre.

CECIL FINE SANDY LOAM.

The surface soil of the Cecil fine sandy loam consists of a gray or light-brown to reddish-brown, mellow fine sandy loam, varying in depth from 5 to 12 inches. The subsoil is a red, stiff, but fairly brittle clay. A small percentage of medium and coarse sand is present in the soil and frequently in the subsoil. The areas in which the surface is gray are prevailing of a lighter texture than those having a redder surface, and occasionally a subsurface stratum of yellowish-red fine sandy loam overlies the red clay subsoil. In places there is present on the surface a rather large quantity of quartz fragments. Included in this type are small spots of Cecil clay loam and Cecil sandy loam, too intricately associated with this soil and too inextensive to be shown separately on a map of the scale of 1 inch to the mile.

The Cecil fine sandy loam occurs throughout the granite and gneiss belt, though it has only a limited development in the northwestern corner of the county. On the eastern side of the county it extends as far south as Moffitt, this being the most southerly point reached by any of the soils of the granite and gneiss belt. The largest area of this type lies on the east side of Deep River, between Buffalo Bridge and Shady Grove Church. Another area of considerable size occurs on the west side of the river north of Moffitt. In the northeastern corner of the county the type is extensively

developed, comprising about one-fourth of the total area of this section.

The surface of the Cecil fine sandy loam varies from undulating and rolling to steeply rolling and hilly, the roughest areas of the type being confined to the bluffs overlooking the streams. The area between Moffitt and Buffalo Bridge, and this is true of nearly all of this type in the northeastern part of the county, has a prevailing gently rolling surface. As a result of its sloping surface features the natural drainage is well established throughout the type.

The native timber growth on this soil consists of hickory, white oak, post oak, red oak, shortleaf pine, dogwood, maple, and poplar, together with a few locusts and cedars.

The Cecil fine sandy loam is well suited to the production of corn, wheat, oats, cotton, clover, cowpeas, sweet potatoes, Irish potatoes, and locally to fruits and garden vegetables. At present it is devoted chiefly to corn, wheat, oats, cowpeas, and clover. Corn produces from 15 to 50 bushels, wheat from 5 to 25 bushels, and oats from 15 to 35 bushels per acre.

In fertilizing corn and cotton on this soil an 8-2-2 or 8-3-3 mixture is applied at the rate of 150 to 250 pounds per acre. For wheat and oats about 200 pounds per acre of a 10-4 mixture or an acreage application of 150 to 400 pounds of an 8-2-2 mixture, with 16 per cent phosphoric acid, in the proportion of 1 to 1, is used.

The Cecil fine sandy loam is a strong soil, though a large part of the type is in poor condition, due mainly to the depletion of humus through the removal of vegetable matter and to the practice of shallow plowing. The humus supply is easily and cheaply increased by plowing under green crops and by adding barnyard manure.

The value of the Cecil fine sandy loam varies from \$30 to \$75 an acre.

CECIL CLAY LOAM.

The Cecil clay loam comprises broadly the intermediate grade of material between the Cecil clay on the one hand and the sandy loams on the other. The surface soil is prevailing a reddish-brown to red loam or clay loam, ranging in depth from 5 to 10 inches. The subsoil is a deep-red stiff clay, which extends to a depth of several feet. When dry the subsoil is brittle and crumbly, but when wet it is plastic and sticky. In many places the soil to a depth of 2 or 3 inches is a gray to reddish sandy or fine sandy loam, while in other local spots the surface material is a red clay or clay loam closely resembling the Cecil clay. This type and the Cecil clay are almost identical in many instances, and small developments of each soil are frequently encountered in the other.

The Cecil clay loam occurs throughout the northern part of the county and along the eastern boundary as far south as the road leading from Buffalo Bridge to Coles Store. The type has its most typical development in the vicinity of Liberty. Areas of considerable size are encountered north and northwest of Trinity, northeast of Edgar, 1 mile north of Staley, 4 miles east of Cox Chapel, and south and east of Levelcross.

The Cecil clay loam is one of the most even-surfaced soils of the county. The greater part of the type is undulating, gently rolling, and rolling. Along the bluffs overlooking the streams there are strips having a steeply rolling and hilly surface, but these are comparatively inextensive. The smoothest part of the type is found near Liberty.

Owing to its dominantly rolling topography, the natural surface drainage is well established over most of the type, though the heavy nature of the subsoil has a tendency to retard the downward movement of water, and as a result cultivation after rains is sometimes considerably delayed.

The virgin forest growth on this type consists of white, red, post, and blackjack oak, together with shortleaf pine, hickory, dogwood, and poplar.

The Cecil clay loam is probably the strongest upland soil of the county. It is admirably adapted to the production of corn, wheat, oats, and clover and it is held in high esteem for these crops. Corn produces 20 to 50 bushels per acre, wheat 10 to 20 bushels, and oats from 15 to 40 bushels. Some cotton is grown on the type, the yields ranging from one-half to one bale per acre.

The methods of fertilization on this soil are not materially different from those on the adjoining soils. Corn usually receives 150 to 300 pounds per acre of a low-grade mixture, wheat about 200 pounds per acre of a 10-4 or an 8-2-2 mixture.

The Cecil clay loam as a whole is probably in a higher state of cultivation than any other type in the county. However, a large part of it is low in humus. Such areas are greatly benefited by deep breaking, plowing under green crops, and liming. The type is valued at \$20 to \$75 an acre.

CECIL CLAY.

The surface soil of the Cecil clay consists of 4 to 6 inches of a reddish-brown to deep-red, rather heavy clay or clay loam. The subsoil, extending to a depth of several feet, is a deep-red, stiff, tough clay. This clay when dry is brittle, but when wet it is decidedly sticky. In places the heavy red clay subsoil has been exposed by

surface washing, but over the greater part of the type the soil to a depth of 2 or 3 inches consists of a red clay loam or loam.

The Cecil clay has a small total area in Randolph County. The largest development is near Marlboro Church. Other areas occur in the northwestern corner of the county.

The type occupies comparatively elevated positions and its surface is prevailingly rolling, consequently the natural surface drainage is good. The downward movement of rain water, however, is considerably retarded by the heavy clay subsoil, and in some places this results in excessively wet areas.

All of the Cecil clay is utilized for farming. It is adapted to the production of corn, wheat, oats, clover, and grasses and is fairly well suited to cotton and cowpeas.

The tillage of this soil is somewhat more difficult than that of its associated type, the Cecil clay loam, but for its improvement practically the same treatment is required.

Wheat yields on this type range from 8 to 20 bushels per acre, the average being about 12½ bushels. Fair yields of red and crimson clover are obtained. Under ordinary methods of treatment yields of 20 to 40 bushels per acre of corn are obtained.

The value of this type is comparable with that of the Cecil clay loam.

DURHAM SERIES.

The Durham series is characterized by the grayish color of the surface soils and the yellow color of the subsoil. The soils are derived from light-colored, rather coarse-grained granite and gneiss, consisting principally of quartz and feldspar, with some mica. The topography is generally gently rolling and the drainage thorough or in places excessive, owing to the sandy, porous texture of the subsoil. These soils occur in the Piedmont region from Virginia southward to Alabama.

DURHAM COARSE SANDY LOAM.

The surface soil of the Durham coarse sandy loam consists of a light-gray, yellowish-gray, or almost white loamy coarse sand to light coarse sandy loam, varying in depth from about 10 to 20 inches. The subsoil of the typical areas is a pale-yellow friable clay carrying an appreciable quantity of coarse sand and fine gravel. In many places the subsoil is streaked or mottled with red or pinkish red, and usually in poorly drained spots it is dull yellow to gray with whitish mottlings. In numerous small areas the disintegrated parent rock is encountered at depths of 30 to 36 inches. This type includes a few spots of Durham sandy loam and small areas in which the subsoil has a reddish-yellow color.

The Durham coarse sandy loam is confined to the northern part of the county. It is not extensively developed. The largest areas occur near Julian, 1 mile north of Lineberry, east of Randolph Church, southwest of Trinity, and southwest of Liberty.

This soil occupies rolling to gently rolling interstream country, and this, together with its coarse texture and porous structure, insures excellent natural drainage for the greater part of the type. The only poorly drained areas are found near the source of small branches. Some of the larger streams have comparatively deep channels, and the only steeply rolling or hilly parts of the type are the narrow strips occupying the bluffs along these streams.

The Durham coarse sandy loam supports a growth of shortleaf pine and hardwoods, including hickory, white oak, red oak, post oak, and dogwood.

The soil is well adapted to the production of bright-yellow tobacco, and a large part of the tobacco crop grown in the county is produced on this soil. It is fairly well suited to cotton, but only a few acres are planted to this crop.

The principal crops grown are tobacco, corn, wheat, cowpeas, and clover. Irish potatoes, sweet potatoes, sorghum, peanuts, apples, peaches, grapes, and garden vegetables do well but are grown only for home consumption and for local markets.

For tobacco fertilizer mixtures analyzing 6-4, 9-6-3, and 8-2-2 are applied at the rate of 400 to 800 pounds per acre. Yields of 600 to 1,000 pounds per acre are obtained. Ordinarily about 200 pounds per acre of an 8-2-2 mixture is applied to corn, and the yields vary from 10 to 40 bushels. Wheat is fertilized about the same as corn. The yields range from 5 to 15 bushels per acre. It is claimed that where tobacco follows clover or cowpeas the leaf is dark, and for this reason tobacco is rarely ever set after a leguminous crop. The Durham coarse sandy loam is deficient in humus, and corn, wheat, and cotton do best where they follow either clover or cowpeas. Excellent results are obtained by farmers who follow this practice, the yields of succeeding corn crops showing a decided increase even without the use of fertilizers.

The value of the Durham coarse sandy loam ranges from \$25 to \$60 an acre.

DURHAM SANDY LOAM.

The surface soil of the Durham sandy loam consists of a light-gray to yellowish-gray, porous sandy loam about 8 to 10 inches deep. Below this the material generally passes into a stratum of slightly heavier material of lighter color, which usually has a thickness of 4 to 6 inches. The subsoil is a yellow, friable, heavy sandy

clay, which becomes heavier with increasing depth and is sometimes mottled with reddish colors in the lower part. In some places the subsoil in the lower part of the 3-foot section is quite like that of the Fredell sandy loam, but this is not typical. Where this type adjoins the soils derived from slate formations the subsoil sometimes passes into a yellow or dull-yellow silty clay. In a few spots the subsoil is a deep-yellow to pale-red friable sandy clay. The soil is for the most part of medium texture, though in local areas noticeable quantities of coarse sand and small quartz fragments are present.

In forested areas and depressions the soil within 2 or 3 inches of the surface is darker colored than the average of the type, owing to the presence of organic matter.

The Durham sandy loam is developed only in the northwestern corner and in the north-central part of the county. The most typical areas of the type occur at Cedar Square Church and about 1 mile southeast of Archdale.

The Durham sandy loam has an undulating to gently rolling and hilly topography. The more level undulating areas comprise inter-stream country and are not extensive. As the streams are approached the surface is more rolling, and areas overlooking the streams are hilly. There are no badly eroded and broken areas. Owing to its prevailing rolling surface and porous sandy soil, the Durham sandy loam is well drained.

The forest growth on this type consists of hickory, white oak, post oak, and red oak, with some shortleaf pine.

The Durham sandy loam is an excellent soil for bright tobacco, sweet potatoes, cantaloupes, watermelons, Irish potatoes, cucumbers, garden peas, peanuts, and sorghum. The principal crops grown are tobacco, corn, wheat, oats, rye, cowpeas, clover, and cotton.

Tobacco produces from 500 to 1,200 pounds per acre, corn from $12\frac{1}{2}$ to 40 bushels, wheat from 5 to 20 bushels, and cotton from one-third to 1 bale per acre.

The methods of fertilization practiced on this type are practically the same as on the other Durham soils. The Durham sandy loam is in many instances in a low state of cultivation, owing mainly to the fact that it has been greatly depleted of humus through continuous clear cultivation. This humus is easily supplied by plowing under such crops as rye, clover, and cowpeas, or by adding barnyard manure.

The value of the Durham sandy loam and coarse sandy loam are nearly the same, ranging from \$25 to \$60 an acre.

DURHAM FINE SANDY LOAM.

The surface soil of the Durham fine sandy loam consists typically of 6 to 8 inches of a gray or light-gray fine to medium sandy loam,

passing gradually into a yellowish-gray fine sandy loam. The subsoil, beginning at an average depth of 14 inches, consists of a dull-yellow, friable fine to medium sandy clay. Usually at a depth of about 30 inches the subsoil is mottled with red, gray, and white, and not infrequently the disintegrated parent rock is encountered at this depth. In a few places on knolls and ridges the subsoil is a deep-yellow or pale-red, friable fine sandy clay. These areas would be mapped as Appling fine sandy loam if of sufficient size to be shown separately on the soil map. Near the source of small streams and in other poorly drained spots the surface soil is darker than typical and the subsoil shows decided mottlings, the prevailing shades being gray and red. In a few places the outcropping of quartz gives rise to stony spots.

Areas of the Durham fine sandy loam varying in size from a few acres to several square miles occur throughout the granite and gneiss belt. The largest area is about 5 miles east of Ramseur between Cox Chapel and Shady Grove Church. Other bodies of considerable size are developed near Grays Chapel and Sandy Creek Church and about 2 miles south of Liberty.

The surface features of this type vary from gently rolling and rolling to hilly. As a rule the interstream areas are gently rolling, though in places there is a long and gradual slope, with intervening slight depressions, toward the stream courses. The steeply rolling and hilly areas are inextensive, being confined to the bluffs along the streams. Except in some small spots, the natural drainage is well established.

The native forest growth includes all the oaks common to this section of the State, together with some old field pine, maple, poplar, dogwood, and hickory.

This soil in other parts of the State has proved to be well adapted to the production of tobacco and cotton, though locally at present only a small acreage is devoted to these crops. It is also suited to corn, oats, wheat, clover, and cowpeas. Irish potatoes, sweet potatoes, sorghum, peanuts, and garden vegetables do well, but are grown only for home consumption.

Where the Durham fine sandy loam is used for tobacco an acreage application of 200 to 800 pounds of a 9-6-3 or 10-4 fertilizer is made, and the yields range from 600 to 1,000 pounds per acre. For corn, applications of 150 to 200 pounds per acre of an 8-2-2 mixture are made. Yields of 10 to 40 bushels per acre are obtained. Cotton produces from one-third to one bale per acre, with about the same fertilizer treatment as is practiced with corn. The greater part of this type is low in humus.

The Durham fine sandy loam is valued at \$30 to \$60 an acre.

The results of mechanical analyses of samples of the soil and subsoil of the Durham fine sandy loam are given in the following table:

Mechanical analyses of Durham fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
232713.....	Soil.....	3.8	11.6	15.2	33.4	13.6	19.2	3.3
232714.....	Subsoil.....	4.8	10.0	9.8	17.0	7.6	20.1	30.6

GEORGEVILLE SERIES.

The types in the Georgeville series are characterized by reddish-brown surface soil and red clay subsoil. Like the soils of the Alamance series, these soils are derived from rocks of the Carolina slate belt. It is believed that the formations giving rise to the Georgeville series are higher in content of iron-bearing minerals than those giving rise to the Alamance. The topography varies from undulating to rolling or broken, the latter condition existing along stream slopes. The types of this series are well drained.

GEORGEVILLE STONY LOAM.

The surface soil of the Georgeville stony loam is about 4 to 8 inches in depth and consists of a gray to red silty loam. The subsoil is typically a red silty clay extending usually to a depth of 3 feet or more. In many places the partially weathered parent rock is encountered at 24 to 28 inches. Scattered over the surface and disseminated throughout both the soil and subsoil are large quantities of slate fragments and some quartzite. Generally the surface is so thickly covered with these rock fragments that the land is unfit for agriculture. Near the base of some of the mountains the subsoil is yellow, and the rock fragments over these areas consist mainly of quartzite.

The Georgeville stony loam is confined almost exclusively to the low mountains and high hills. The largest areas occupy the summits and slopes of the chain of hills extending in a westerly direction from Spero to the Hoover Hill mine and thence parallel with the Uharie River into Montgomery County. Other areas of considerable size occur in the south-central part of the county on Needhams and Pond Mountains. Small areas are scattered over the entire south-western two-thirds of the county. This type has the highest elevation and the roughest topography of any in the county. On the summits of some of the highest mountains there are small areas with a gently rolling surface, but with these exceptions the type is steeply

rolling, hilly, and precipitous. On the slopes of nearly all of the largest mountains rock ledges and cliffs occur.

The Georgeville stony loam is not cultivated. At one time the type was well forested, but nearly all of the merchantable timber has been removed, and only a small growth of white, red, post, and blackjack oak, together with some hickory, sourwood, dogwood, and pine remains.

The greater part of this type is suited only to forestry. A few acres may be used profitably for the growing of apples, grapes, and other fruits.

The Georgeville stony loam is valued at \$5 to \$8 an acre.

GEORGEVILLE SILT LOAM.

The surface soil of the Georgeville silt loam consists of a light-gray to slightly reddish silt loam, which usually passes into a yellowish-red silt loam at about 3 to 6 inches. The subsoil of the typically developed areas is encountered at 5 to 12 inches, and consists of a dull-red, stiff, but fairly brittle silty clay, which extends to a depth of about 3 feet. In many localities, over restricted areas, the surface soil is a pale-red to reddish-brown silt loam underlain directly by the silty clay subsoil. Frequently on the steeper slopes and on a few of the knolls the original surface material has been removed by erosion, leaving the red silty clay exposed. This type is so intricately associated with the Georgeville silty clay loam and the Alamance silt loam and the gradation of one to another of these types is so gradual that it is difficult in places to draw definite soil boundaries. Fragments of the parent rock and quartz are encountered on the surface in places, the quartz being conspicuous mainly on the crests of knolls and ridges. Near New Hope Church, in the southwestern part of the county, and near Coleridge there are small areas in which some fine slate fragments are scattered over the surface and mixed with the soil.

The Georgeville silt loam is by far the most extensive soil type in Randolph County. It is the predominating soil throughout the southern and central parts of the county, extending as far north as Randleman and thence in a due west direction to the Davidson County line. A narrow strip continues north from Randleman into Guilford County.

The topography ranges from gently rolling and rolling to decidedly hilly and broken. The type as it occurs in the southwestern corner of the county is for the most part comparatively smooth, though some rolling and hilly areas are encountered. Throughout the entire type there are interstream areas of considerable size hav-

ing a fairly smooth surface, but generally as the streams are approached the topography becomes decidedly hilly and broken. By reason of its surface configuration the natural drainage of the Georgeville silt loam is good, and even excessive in many localities.

The type supports a varied forest growth, consisting of white, post, red, and blackjack oak, together with considerable pine and some black gum, sweet gum, dogwood, sourwood, maple, poplar, and cedar. A large part of the merchantable timber has been removed, and the cutting of oak crossties is still an industry of some importance. In a few localities some of the pine is standing, but forest of this kind is being rapidly cut.

This type is suited to the production of corn, wheat, clover, and grasses. The growing of clover on the more rolling lands and hill-sides to prevent washing and to furnish pasturage for cattle is an excellent practice.

Corn yields range from 15 to 45 bushels per acre, averaging about 20 bushels; wheat produces from 5 to 20 bushels; oats from 20 to 35 bushels, and cotton from one-third to two-thirds bale per acre. Irish potatoes, sweet potatoes, sorghum, garden vegetables, apples, pears, and peaches are grown mainly for home consumption. For wheat, an acreage application of 200 to 250 pounds of fertilizer analyzing 10-4¹ is made. For corn, 150 to 200 pounds of an 8-2-2 mixture is applied, and for cotton about 200 or 250 pounds of an 8-2-2 or an 8-3-3 mixture. The yields of cotton on this type are considerably decreased by the early frosts, which prevent the full maturity of the crop. As a rule the Georgeville silt loam is low in humus.

The value of the Georgeville silt loam depends upon its location and state of improvement. The best areas of the type near the largest towns are held at \$40 to \$75 an acre, while the rougher and more remote areas can be bought for \$8 to \$20 an acre.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the Georgeville silt loam:

Mechanical analyses of Georgeville silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
232718.....	Soil.....	0.5	1.4	1.4	4.0	7.8	67.5	17.3
232719.....	Subsoil.....	.0	.1	.2	.4	.6	45.3	53.6

GEORGEVILLE SILTY CLAY LOAM.

The surface soil of the Georgeville silty clay loam consists of a reddish-brown to red silty clay loam or heavy silty loam, which ex-

¹ Ten per cent P₂O₅ and 4 per cent K₂O.

tends to a depth of 5 to 8 inches. The subsoil to a depth of several feet is a deep-red, stiff but fairly brittle clay or silty clay. There is considerable variation in the color of the surface soil, due to the different depths and methods of cultivation and also to erosion. In a few localities, particularly in the vicinity of Farmer, the surface soil to a depth of 2 or 3 inches consists of a gray heavy silty loam, and the surface of this type has the appearance of that of the Georgeville silt loam. In small areas fragments of quartz and slate occur on the surface. The Georgeville silty clay loam and Georgeville silt loam grade into each other so imperceptibly that not infrequently the boundary between the two on the soil map is arbitrarily placed.

The Georgeville silty clay loam appears in numerous but comparatively inextensive areas throughout the slate belt. One of the most prominent bodies extends along the west side of Deep River from a point opposite Ramseur nearly to a point opposite Coleridge. Other areas are encountered in all directions about Randleman, near Sophia, around Tabernacle Church, surrounding Mechanic and Farmer, and southeast and southwest of Grays Chapel.

This type presents a gently rolling, rolling, and hilly topography. The smoothest areas occur in interstream country in the vicinity of Farmer, Mechanic, and Tabernacle Church. In some sections of the county this soil is extensively developed along stream courses, and in such situations it is generally steep and hilly. North of Sophia and northeast of Randleman rather large areas lie on the drainage divides, but reach down in some places to the streams. The surface of these areas, except near the streams, is comparatively smooth.

As a result of its prevailingly rolling topography the surface drainage is good. Over small areas the heavy silty clay subsoil prevents the free downward passage of water, and in these the moisture conditions are less satisfactory.

The native vegetation on the Georgeville silty clay loam is mainly hardwoods, including hickory, white oak, post oak, and red oak, with large areas of pine in places and some cedar, dogwood, sourwood, and maple.

This soil is well suited to the production of corn, wheat, oats, and clover, and it is utilized mainly for these crops. Corn yields vary from 20 to 50 bushels, averaging about 25 bushels per acre. The average yield of wheat is about $12\frac{1}{2}$ bushels per acre, though yields of 30 bushels have been obtained. Oats yield 20 to 35 bushels per acre. Fertilizer practice is about the same as on the other upland soils.

The Georgeville silty clay loam is a strong soil and is easily built up to a high state of productiveness. On account of its heavy nature it has a tendency to clod, especially if plowed when moisture condi-

tions are unfavorable. Deep breaking, the incorporation of humus, and liming improve the structure.

The value of the Georgeville silty clay loam varies widely in different parts of the county. In the most desirable localities it is valued at \$40 to \$75 an acre. Uncleared areas with no merchantable timber sell for \$10 to \$40 an acre.

The results of mechanical analyses of samples of the soil and subsoil are given in the following table:

Mechanical analyses of Georgeville silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
232701.....	Soil.....	1.9	1.4	1.2	4.0	13.4	49.2	28.8
232702.....	Subsoil.....	.0	.2	.3	.9	3.0	29.2	66.5

ALAMANCE SERIES.

The surface soils of the types in the Alamance series are gray to almost white, and the subsoils are yellow and composed of rather compact silty clay. Scattered over the surface are fragments of the parent slaty rocks, forming a belt in central North Carolina, and extending a short distance into South Carolina. These slates are usually quite fine grained and contain little mica. They differ in structural and mineralogical characteristics from the sericitic and micaceous schists giving rise to the York soils, the Alamance soils being less micaceous and lacking the greasy feel of the York material. The topography varies from nearly flat to rolling, or in some places steeply rolling.

ALAMANCE SILT LOAM.

The surface soil of the Alamance silt loam consists of a smooth, mellow, light-gray to almost white silt loam, passing gradually at 2 or 3 inches into a yellowish-gray or yellow silt loam which extends to a depth of about 6 to 10 inches. Owing to its uniformly silty texture, together with its whitish surface, this type has the appearance of flour, and for this reason it is locally called "white floury land." The subsoil of the typical areas consists of a yellow silty clay, which in the lower part of the 3-foot section has a yellowish-red cast, or shows mottlings and streaks of red. Not infrequently at a depth of about 24 to 30 inches the silty clay grades into a yellowish-gray to ashy-colored compact silt loam. In poorly drained and slightly depressed situations the subsoil is a pale-yellow silty clay mottled with gray and white, and in many of the areas lying on knolls and ridges the subsoil is reddish yellow to brownish

yellow. Almost all variations in color from pale yellow to red may thus appear in the subsoil, and there are included with this type a few small areas in which the subsoil is identical with that of the Iredell loam.

Outcrops of quartz veins give rise to numerous gravelly knolls and ridges, and in several areas large quantities of slate fragments are scattered over the surface and throughout the 3-foot section. Occasionally the silty clay subsoil grades into the disintegrated slate at a depth of 30 to 36 inches.

In areal extent the Alamance silt loam is the soil of second importance in the county. It has only a small development west of Caraway Creek and Uharie River, but it occupies about one-third of the total area of the slate belt on the east side of these streams. The soil occurs in areas of irregular outline varying in size from about 10 acres to 10 or 15 square miles.

This soil has probably the most varied surface configuration of any type in the county, occupying all topographic positions except the mountains and the lowlands along the larger streams. In the central, south-central, and southeastern parts of the county large interstream areas with a prevailingly gently rolling to rolling topography occur, but within these areas there are numerous knolls and ridges with an occasional ravine. As a rule the surface becomes broken as the streams are approached, and areas occupying the bluffs along the streams are sometimes badly eroded.

Owing to the rolling and hilly surface, the natural surface drainage is good over the greater part of the type. Those areas having a subsoil similar to the Iredell loam subsoil are usually not well drained, and occasionally there is within the larger areas an inextensive depression in which the natural drainage is not well established, but these areas are negligible when compared with the total extent of the type.

The Alamance silt loam supports a forest growth consisting principally of hardwoods and shortleaf pine. The hardwoods include hickory, white oak, red oak, post oak, blackjack oak, dogwood, and maple, with considerable poplar in some areas.

Land of this type of soil is utilized principally for growing corn, wheat, oats, cowpeas, and clover. Sorghum is grown to a small extent, and produces a sirup of excellent quality. A small acreage is devoted to cotton. Irish potatoes, sweet potatoes, peanuts, fruits, and garden vegetables are grown for home consumption and to a small extent for local markets. Corn yields vary from 5 to 35 bushels per acre, wheat yields from 4 to 15 bushels, and the yield of oats from 10 to 25 bushels. In a few instances yields of 200 to 300 bushels per acre of Irish potatoes have been obtained.

The methods of fertilization on this type vary in different sections of the county. Near Seagrove and Ramseur and in a few other localities corn and cotton are commonly fertilized with 100 to 400 pounds per acre of a mixture consisting of 8-2-2 or 8-3-3 and 16 per cent phosphoric acid in the proportion of 1 to 1. Wheat sometimes receives a similar application. Ordinarily in the vicinity of Ashboro applications of about 200 pounds per acre of a 10-4 mixture are made for wheat and oats, while for corn and cotton 150 to 300 pounds per acre of an 8-2-2 or 8-3-3 mixture is applied.

The greater part of the Alamance silt loam is in poor physical condition. It is decidedly deficient in humus, and in some areas, particularly the poorly drained spots, the soil, as shown by litmus-paper tests, is acid. To correct this acidity and to improve these areas otherwise, drainage and liming are necessary.

The value of this soil varies greatly, depending on its state of improvement and location. In general, it sells for \$10 to \$50 an acre.

IREDELL SERIES.

The soils of the Iredell series are light brown to almost black in color. The subsoils consists of extremely plastic, sticky, or waxy clay of a yellowish-brown to greenish-yellow color. Disintegrated rock is very often encountered within the 3-foot section, and small iron concretions are present in many places. The topography varies from nearly flat to gently rolling. The parent rocks consist mainly of diorite, hornblende schist or hornblende gneiss, and chloritic rocks.

IREDELL STONY LOAM.

The Iredell stony loam, to a depth of about 6 to 12 inches, consists of a gray to brownish-gray silty to very fine sandy loam. The subsoil characteristically is a dull-yellow or yellowish-brown, waxy, impervious clay, passing at a depth of about 20 to 30 inches into a soft disintegrated rock, mainly diorite. The surface is practically covered with fragments of greenish diorite and blue to gray slate. Frequently these rock fragments are distributed throughout the 30-inch soil section.

The Iredell stony loam occurs in close association with the Georgeville stony loam, but it has only a small total area in the county. The largest area occurs near Hopewell Church. Another area almost as large is encountered about 1 mile south of Marlboro Church. One of the most typical areas in the county is developed 1 mile south of Ulah.

The Iredell stony loam occupies the crests and slopes of hills and low mountains, and its surface is rugged. On account of its hilly

topography the run-off of rain water is rapid, and in places the type is badly eroded.

The forest growth on this type consists of blackjack, post, red, and white oaks, together with some hickory, dogwood, sourwood, old field pine, persimmon, and cedar.

Owing to the uneven surface and the presence of the rock fragments practically none of this type is under cultivation. Like the Georgeville stony loam it is best suited to forestry, although a few patches can be used for the production of corn or for grazing. This land is valued at about \$5 to \$8 an acre.

IREDELL SANDY LOAM.

The surface soil of the Iredell sandy loam consists of a gray to brownish-gray light sandy loam or loamy sand grading into a light gray sandy loam at about 6 inches. The subsoil, beginning at depths of 12 to 20 inches, is characteristically a dingy-yellow or brownish-yellow, sticky, impervious clay, which generally grades into the disintegrated diorite rock at a depth of about 30 inches. A noticeable quantity of small rounded iron concretions is scattered over the surface and, in local areas, disseminated throughout the soil section. Included in this type are patches of Iredell loam of insufficient size to be shown separately on the soil map.

The Iredell sandy loam is confined to the northwestern corner of the county. The largest areas occur northwest of Levelcross, east of Cedar Square Church, north and west of Glenola, at Fairview and Prospect Churches, west of Trinity, and 2 miles northwest of Mount Gilead Church.

The surface configuration of the Iredell sandy loam varies from gently rolling to rolling, becoming more rolling, broken, and steep as the streams are approached. The most gently rolling and even surfaced areas occupy the low ridges. Owing to the open and rather loose structure of the surface soil and the rolling topography, this type is naturally well drained. The run-off of rain water on the steeper slopes is rapid and slightly eroded areas occur in a few localities.

The native forest growth consists of blackjack oak, white oak, red oak, and post oak, together with some hickories, cedar, and pine.

The Iredell sandy loam is well adapted to the production of tobacco, cotton, corn, and sweet potatoes.

With an acreage application of 150 to 200 pounds of an 8-2-2 fertilizer, corn yields an average of 25 bushels per acre. For tobacco the most successful farmers apply 400 to 800 pounds per acre of a 9-6-3 or 6-4-4 mixture, and obtain yields of 600 to 1,000 pounds per acre. Cotton is not extensively grown on this type, but where

the soil is devoted to this crop about 200 pounds per acre of an 8-2-2 fertilizer is applied and the average yield is one-half bale per acre. Of the mineral fertilizers kainit and phosphoric acid give best results. The former largely prevents the rusting of cotton and the frenching of corn, while the latter has a tendency to hasten the maturity of crops and to increase the yields of fruit.

The value of the Iredell sandy loam depends largely upon its location and improvement. It is generally held at \$20 to \$60 an acre.

IREDELL LOAM.

The surface soil of the Iredell loam, locally called "pipe-clay land," consists of a gray silty loam to fine sandy loam or loam ranging in depth from about 6 to 12 inches. Frequently a yellowish subsurface stratum is encountered at about 4 to 8 inches below the surface, and this is underlain directly by heavy clay. The subsoil is prevailingly a dingy-yellow or yellowish-brown, sticky, waxy, impervious clay. At about 24 to 30 inches the clay grades quickly into greenish-yellow disintegrated diorite rock. This rock usually maintains its original structure and has a yellow and black speckled appearance, due to the presence of partially weathered hornblende. Throughout the dominant areas the surface soil carries large quantities of small rounded iron pebbles, and in places these are so numerous that the surface soil has the appearance of a coarse sandy loam. The subsoil, where exposed to the action of the atmosphere, is brown, and upon drying it cracks, usually in hexagonal blocks. Near Pleasant Grove Church there is a large body of this type, which carries on the surface an appreciable quantity of fine slate fragments. In a few spots the surface soil of this area has a slightly reddish tinge and below the typical subsoil a red stiff clay is encountered. There are also included in the Iredell loam spots of Iredell stony loam, which are so intricately associated with the typical soil and of such small size that they can not be shown separately on the soil map.

This type is developed in areas varying in size from a few acres to several square miles over the greater part of the county. The largest area occurs along the west side of the Uharie River between Loffins Store and Siloam Church. Other large areas are encountered between Cox Chapel and Concord Church, along the public highway leading southwest from the County Home, near Martha, southwest of Pinson, north of Flint Hill Church, northeast of Ashboro, and northwest of Liberty Grove Church.

The surface features of the Iredell loam vary widely, the type comprising gently sloping, rolling, and hilly country, with an occasional slightly depressed area. As a result of its prevailingly rolling surface this type generally has good natural surface drain-

age. There are, however, inextensive areas, usually near the source of small streams, where the surface drainage is not well established. The subsoil of this type is very impervious to both air and water, and this accounts largely for the puddling of the soil in some of the poorer drained situations.

The native forest growth on the Iredell loam consists of black-jack, white, post, and red oak, together with some pine and cedar. Probably about one-third of the type is cleared and under cultivation.

This soil is especially suited to the production of wheat, oats, and grasses. It is used principally for corn, wheat, cotton, and clover.

Corn on this type is usually given an acreage application of 200 pounds of an 8-2-2 fertilizer, and the yields range from 15 to 45 bushels, averaging about 30 bushels per acre. As a rule wheat receives 200 pounds per acre of a 10-4 mixture, the yields varying from 8 to 15 bushels, with an average of about 10 bushels per acre. With an application of 200 pounds per acre of an 8-2-2 mixture cotton produces from one-half to two-thirds bale per acre. Liberal applications of kainit largely prevent the frencing of corn and the rusting of cotton on this and the other Iredell soils.

The Iredell loam is valued at \$15 to \$30 an acre.

CONGAREE SERIES.

The soils and subsoils of the Congaree series are brown to reddish brown, there being comparatively little change in texture, structure, and color from the surface downward. Occasionally grayish and yellowish mottling is encountered in the subsoil of the poorly drained areas. These soils are developed in the overflowed first bottoms of the streams of the Piedmont region and in similar positions in the Coastal Plain along streams issuing from the Piedmont.

CONGAREE SILT LOAM.

The surface soil of the Congaree silt loam is typically a brown or chocolate-colored silty loam, ranging in depth from 8 to 15 inches. The subsoil to a depth of 36 inches or more is a light chocolate brown silty loam, slightly more compact than the surface soil. Frequently the lower part of the 3-foot section contains a slightly higher percentage of clay than the upper part, producing a silty clay loam. Finely divided mica is generally present in the soil and subsoil of this type. Bordering the stream courses in some localities are narrow strips of a brown fine sandy loam or fine sand, but owing to their small extent it is impracticable to separate these areas from the main type. Near the source of the smaller streams small areas in which the soil varies in texture from a silty loam to sandy loam

and in color from chocolate brown to light gray are encountered. These areas are used principally for the production of hay, and would be mapped as Meadow if large enough to be shown separately.

The Congaree silt loam occupies the lowlands along the Uharie and Deep Rivers and their tributaries. The surface of this type is nearly level, with a slight gradient toward the stream and in the direction of flow. The fine sandy loam or fine sand ridges are usually more elevated than the surrounding areas of the type. The general drainage is good, although ditches are sometimes constructed to remove the seepage waters from the uplands into the stream channels. The greater part of this type is situated several feet above the normal water level of the streams, but it is subject to inundation during heavy freshets and as a result of these overflows tillage operations are often considerably delayed in the spring.

Practically all of the Congaree silt loam is under cultivation. It is especially adapted to the production of corn, and is held in high esteem for this crop. The fine sandy loam areas are well suited to watermelons. Wheat, oats, and grasses do well, but owing to the overflows which occur during the winter months, and to the fact that the type is usually retained for corn, it is not often utilized for these crops. The yields of corn on this type vary from 25 to 50 bushels per acre without fertilizer or manure.

The Congaree silt loam has an estimated value of \$75 to \$100 an acre. It is usually held in connection with other soils.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Congaree silt loam:

Mechanical analyses of Congaree silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
232726.....	Soil.....	0.0	0.2	0.4	4.4	10.1	70.3	14.7
232727.....	Subsoil.....	.0	.1	.4	3.8	9.5	65.5	20.7

SUMMARY.

Randolph County is situated in the center of North Carolina. It has an area of 749 square miles, or 479,360 acres.

The surface of the greater part of the county is gently rolling to rolling and hilly, with smaller areas of decidedly broken country near the streams. A chain of high hills, locally called "mountains," extends from near Spero in a westerly direction to Hoover Hill

mine and thence nearly parallel with the Uharie River into Montgomery County.

Uharie River and Deep River drain the greater part of the county. The south-central part of the county is drained by the east and west prongs of Little River.

Some parts of the county are fairly well settled, but a large proportion of the land is not under cultivation.

According to the 1910 census, Randolph County has a population of 29,491. Ashboro, the county seat, is located near the center of the county. It has a population of 1,865. Flour mills, furniture factories, and lumber mills are in operation in Ashboro, and it constitutes a good local market. Randleman is a cotton manufacturing center. It has a population of 1,950. Ramseur is also important industrially.

The transportation facilities of the county are fair. Branch lines of the Southern, Norfolk & Southern, and Carolina & Yadkin River Railroads traverse the county. Road building is receiving considerable attention.

The climate of Randolph County is mild and healthful. The mean annual temperature is 57° F. The average annual precipitation is about 50 inches.

Corn and wheat are the most important crops. Corn is grown on about 41,500 acres, wheat on about 30,000 acres, and cotton, which is probably the third crop of importance, on only about 2,000 acres. Other crops of less importance are oats, clover, rye, tobacco, Irish potatoes, sweet potatoes, sorghum, small fruits, and garden vegetables, which are grown mainly for home consumption.

Within comparatively recent years decided improvement in the methods of growing and harvesting these and other crops has taken place.

Commercial fertilizers are in general use throughout the county.

Farm labor is generally scarce. The value of farm land ranges from \$50 to \$60 for the best land near the towns to as low as \$4.50 to \$5 for uncleared land with no merchantable timber in more remote sections. In a few cases highly improved farm land is held at \$75 to \$100 an acre.

Dairying and stock-raising industries are not developed in Randolph County. The latter offers excellent opportunities.

The soils of Randolph County are derived mainly from two rock belts, the most important of which is closely associated with the Carolina Metamorphic Slate and Volcanic Belt, and extends over about three-fourths of the county. These rocks give rise to two distinct

soil series, the Georgeville and Alamance. In the northern end of the county and a larger part of the eastern section the rocks are mainly granite with some intrusive rocks, chiefly diorite and diabase. The granites give rise to the Cecil and Durham series. The Iredell soils are derived from the intrusive rocks. The Congaree silt loam is an alluvial soil derived from material washed from the upland soils.

The soils of Randolph County are grouped in six series. The Cecil series is represented by four types, the Durham by three, the Georgeville by three, the Alamance by one, the Iredell by three, and the Congaree by one.

There are thus 15 soil types mapped in Randolph County. All the heavy clays, clay loams and silt loams are well suited to the production of wheat, corn, oats, and clover, and improved areas of these types have a high agricultural value. The light-gray sandy loams are good tobacco soils, though only a small acreage is devoted to this crop.



[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, providing "for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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